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Neu eingegangene Arbeiten

S. Hess, Institut für Theoretische Physik der Universität Erlangen-Nürnberg, Erlangen:

Anisotropy of the Photo-Induced Persistent Internal Polarization of a Semiconductor

A theory is presented for the anisotropy of the persistent internal polarization, i.e. for its dependence on the angle between the applied electric field and the *c*-axis as it has been observed with Li-doped ZnO crystals. Starting point is a Boltzmann equation with anisotropic collision and capture terms. From it, a relation is derived between the ratios of the polarizations for electric fields perpendicular and parallel to the *c*-axis and of the effective capture cross sections for photo electrons moving parallel and perpendicular to the *c*-axis.

M. Forker and A. Hammesfahr, Institut für Strahlen- und Kernphysik der Universität Bonn:

The Internal Electric Fieldgradient in Antiferroelectric $PbZrO_3$ Studied by Perturbed Angular Correlations

The internal electric fieldgradient (EFG) at the Zr-site in antiferroelectric polycristalline $PbZrO_3$ has been investigated as a function of temperature by time differential angular correlation measurements. For the application of this technique $PbZrO_3$ was doped with small amounts of radioactive ^{181}Hf.

In the antiferroelectric phase of $PbZrO_3$ the EFG decreases continously with increasing temperature and exhibits a sharp discontinuity at 230 °C, the Curie point of the compound. In the cubic phase a small remaining EFG is observed which is probably caused by lattice imperfections in the source.

The antiferroelectric distortion of the lattice decreases slightly when the temperature approaches the Curie point, as shown by the temperature dependence of the asymmetry parameter of the EFG.

The measured EFG at room temperature is compared with the result of a lattice sum calculation.

S. Koički and A. Koički, The Boris Kidrič Institute of Nuclear Sciences, Beograd, Yugoslavia:

Magnetic HFI of Cerium in an Iron Garnet Investigated by Angular Correlations

The magnetic HFI of cerium ion in a lanthanum-doped yttrium iron garnet is investigated by the gamma-gamma angular correlation technique. It is found that cerium, formed after radioactive decay of La^{140}, reaches the ground state of Ce^{3+} in a time short compared with the nuclear state life-time of 4.9 nsec.

Quasi-static as well as time-dependent interactions are detected, yielding an internal field of $H_{\text{eff}}=(21.5\pm 3)$ kOe at the nuclei of cerium. The molecular field theory is applied in the analysis of data, and values for the exchange field, the spin-lattice relaxation time and the magnetic moment of cerium ion in an iron garnet at room temperature are deduced. These values are: $H_{\text{exch}}=(147\pm 20)$ kOe, $\tau_e=(4.5\pm 0.6)\times 10^{-13}$ sec and $\langle\mu_z\rangle=(0.017\pm 0.002)$ Bohr magnetons.

W. Kaule, Institut für Angewandte Physik der Universität Erlangen:
Zweiquantenabsorption bei freien Exzitonen in Zinkoxid (Two Quantum Absorption by Intrinsic Excitons in ZnO)

The two photon absorption spectrum at the intrinsic absorption edge of ZnO is measured with various directions and modes of polarization of the incident light beams. Several peaks are observed, corresponding to the $2P_{0,\pm1}$-exciton states of the 3 series *A*, *B*, *C* (which occur on account of the threefold upper valence band). The anisotropy of the product of reduced effective mass times dielectric constant determined from the line positions is compatible with theoretical predictions. The lack of *S*-exciton states in the two quantum absorption spectrum of ZnO is discussed in detail.

A. Stahl und H. Wolters, Institut für Theoretische Physik der RWTH Aachen:
Elektromagnetische Randbedingungen und Oberflächeneffekte in phänomenologischer Sicht (Electromagnetic Boundary Conditions and Surface-Effects from a Phenomenological Point of View)

Since in recent time several authors have questioned the traditional opinion on electromagnetic boundary conditions and the derivation of Fresnel's equations, this problem is reexamined from a strictly phenomenological point of view. Two kinds of surface-singularities are considered: those which are necessary to fullfill the boundary conditions and those which stem from a special surface-susceptibility. The discussion is confined to the case where there is no spatial dispersion.

P. H. Dederichs, Institut für Festkörperforschung der Kernforschungsanlage Jülich:
J. Pollmann, Institut für Physik der Universität Dortmund:
Elastic Displacement Field of Point Defects in Anisotropic Cubic Crystals

The elastic displacement field of point defects in cubic crystals is calculated for weak anisotropy by second order perturbation theory and by a variational procedure. The results are compared with numerical calculations for Cu. Further analytical approximations are given for the volume change in an infinite crystal and for the interaction energy, of two point defects.

H. Bross and H. Weilacher, Sektion Physik der Universität München:
Some Comments Refering to the Definition of the Position-Operator Case of the Born-von Kármán Boundary Conditions

A new position operator is defined obeying the Born-von Kármán boundary-conditions. It is hermitian and satisfies the common operator calculus. Its matrix-elements with respect to Bloch functions are derived and expressed by a generalized function.

E. W. Weber, I. Physikalisches Institut der Universität Heidelberg:
Optical Pumping of Ions in Buffer Gases. I. Method and Basic Properties

A method for polarizing thermal ions in buffer gases directly by optical pumping is presented in detail. The production and storage of Sr^+ (and Ba^+) ions in noble gases, their diffusion and their relevant collision processes are discussed. Furthermore an arc discharge hollow cathode for the generation of intense ionic resonance lines is described. The Sr^+ ($5\,^2S_{1/2}$) and electron spin polarizations are treated by rate equations. Fitting their solutions to experimental data obtained from transient signals yields an estimate of a few 10^3 Å^2 for the Sr^+-electron spin exchange cross section.

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